

### Listing of Claims

1. (Currently Amended) X-ray imaging device with computer means ~~(17)~~ which is provided for visualizing the blood flow in a coronary vascular tree of a patient such that the visualization is effected based on data which contain a first set ~~(1)~~ of X-ray projection images of the vascular tree in various phases of the heart cycle, a first ECG ~~(2)~~ of the patient recorded simultaneously with the first set ~~(1)~~, a second set ~~(6)~~ of X-ray projection images recorded during or after the administration of a contrast agent and a second ECG ~~(7)~~ of the patient ~~(15)~~ recorded simultaneously with the second set ~~(6)~~, which computer means ~~(17)~~ comprise a program control which operates in accordance with the following method steps for determining the time-dependent concentration of contrast agent within the three-dimensional structure of the vascular tree:

- Reconstruction of the three-dimensional structure of the vascular tree during the various phases of the heart cycle using the first set ~~(1)~~ of X-ray projection images and splitting of the structure into a number of vascular segments ~~(5, 8)~~;
- Determining the time-dependent concentration of contrast agent ~~(9)~~ within the reconstructed three-dimensional structure of the vascular tree by

- aa) Assignment of the X-ray projection images of the second set ~~(6)~~ to a respective phase of the heart cycle using the recorded second ECG ~~(7)~~;
- bb) Finding local image areas assigned to the individual vascular segments ~~(8)~~ within the X-ray projection images of the second set ~~(6)~~ corresponding to the spatial positions of the vascular segments ~~(8)~~ in the respective phase of the heart cycle according to the three-dimensional structure of the vascular tree;
- cc) Determining the concentration of contrast agent within the vascular segments ~~(8)~~ by evaluating the X-ray absorption within the local image areas found in the method step bb);

- Visualization of the flow of contrast agent through the three-dimensional structure of the vascular tree according to the time-dependent distribution of contrast agent ~~(9)~~.

2. (Currently Amended) X-ray imaging method as claimed in claim 1, ~~characterized in that~~ wherein the second set ~~(6)~~ of X-ray projection images is recorded during or after the administration of the contrast agent, while the vascular tree fills with contrast agent and then the first set ~~(1)~~ of X-ray projection images is recorded after the vascular tree is completely filled with contrast agent.

3. (Currently Amended) X-ray imaging device as claimed in claim 1, with means ~~(10, 11, 12, 13)~~ for generating the first and the second set of X-ray projection images of the coronary vascular tree of the patient ~~(15)~~ under various projection directions and with means ~~(18)~~ for recording the ECG of the patient ~~(15)~~ during the recording of the first and second sets of X-ray projection images.

4. (Currently Amended) X-ray imaging device as claimed in claim 2, wherein the computer means ~~(17)~~ are arranged such that during or after the administration of the contrast agent first the second set ~~(6)~~ of X-ray projection images is recorded while the vascular tree fills with contrast agent, and then the first set ~~(1)~~ of X-ray projection images is recorded, after which the vascular tree completely fills with contrast agent.

5. (Currently Amended) X-ray imaging device as claimed in claim 2 ~~or 3~~, wherein the computer means ~~(17)~~ are further arranged such that the recording of the first and/or second set of X-ray projection images is effected at a plurality of projection angles by means of continuous rotation-X-ray imaging.

6. (Currently Amended) X-ray imaging device as claimed in ~~one of the claims 1 to 5~~, wherein the computer means ~~(17)~~ are arranged such that for reconstructing the three-dimensional structure of a computer-aided modeling of the vascular tree is effected while eliminating the other anatomical structures contained in the first set ~~(1)~~ of X-ray projection images.

7. (Currently Amended) Computer program for an X-ray imaging device for visualization of the blood flow in a coronary vascular tree of a patient, wherein the computer program receives as input variables data which contain a first set ~~(1)~~ of X-ray projection images of the vascular tree in various phases of the heart cycle, a first ECG ~~(2)~~ of the patient ~~(15)~~ recorded simultaneously with the first set ~~(1)~~, a second set ~~(6)~~ of X-ray projection images recorded during or after the administration of a contrast agent and a second ECG ~~(7)~~ of the patient ~~(15)~~ recorded simultaneously with the second set ~~(6)~~, which computer program on the computer means ~~(17)~~ of the X-ray imaging device implements a program control which operates in accordance with the following method steps for determining the time-dependent concentration of contrast agent within the three-dimensional structure of the vascular tree:

- Reconstruction of the three-dimensional structure of the vascular tree during the various phases of the heart cycle using the first set ~~(1)~~ of X-ray projection images and splitting of the structure into a number of vascular segments ~~(5, 8)~~;
- Determining the time-dependent concentration of contrast agent ~~(9)~~ within the reconstructed three-dimensional structure of the vascular tree by
  - aa) Assignment of the X-ray projection images of the second set ~~(6)~~ to a respective phase of the heart cycle using the recorded second ECG ~~(7)~~;
  - bb) Finding local image areas assigned to the individual vascular segments ~~(8)~~ within the X-ray projection images of the second set ~~(6)~~ corresponding to the spatial positions of the vascular segments ~~(8)~~ in the respective phase of the heart cycle according to the three-dimensional structure of the vascular tree;
  - cc) Determining the concentration of contrast agent within the vascular segments ~~(8)~~ by evaluating the X-ray absorption within the local image areas found in the method step bb);
- Visualization of the flow of contrast agent through the three-dimensional structure of the vascular tree according to the time-dependent distribution of contrast agent ~~(9)~~.

8. (Currently Amended) X-ray imaging method for visualizing the blood flow in a coronary vascular tree of a patient having the following method steps:

- a) Recording a first set ~~(1)~~ of X-ray projection images of the vascular tree during various phases of the heart cycle while simultaneously recording a first ECG ~~(2)~~ of the patient ~~(22)~~
- b) Reconstruction of the three-dimensional structure of the vascular tree during the various phases of the heart cycle from the first set ~~(1)~~ of X-ray projection images and splitting of the structure into a number of vascular segments ~~(5, 8)~~;
- c) Recording of a second set ~~(6)~~ of X-ray projection images of the vascular tree during or after the administration of a contrast agent while a second SECG ~~(7)~~ of the patient is being recorded;
- d) Determining the time-dependent concentration of contrast agent ~~(9)~~ within the vascular tree's three-dimensional structure reconstructed in the method step b) by
  - aa) Assignment of the X-ray projection images of the second set ~~(6)~~ to a respective phase of the heart cycle using the recorded second ECG ~~(7)~~;
  - bb) Finding local image areas assigned to the individual vascular segments ~~(8)~~ within the X-ray projection images of the second set ~~(6)~~ corresponding to the spatial positions of the vascular segments ~~(8)~~ in the respective phase of the heart cycle according to the three-dimensional structure of the vascular tree;
  - cc) Determining the concentration of contrast agent within the vascular segments ~~(8)~~ by evaluating the X-ray absorption within the local image areas found in the method step bb);
- e) Visualization of the flow of contrast agent through the three-dimensional structure of the vascular tree according to the time-dependent distribution of contrast agent ~~(9)~~ determined in method step d).

9. (Currently Amended) X-ray imaging method as claimed in claim 8, wherein first the second set ~~(6)~~ of X-ray projection images is recorded during or after the administration of the contrast agent, while the vascular tree fills with contrast agent and then the first set ~~(1)~~ of X-ray projection images is recorded after the vascular tree is completely filled with contrast agent.

10. (Currently Amended) X-ray imaging method as claimed in claim 8 ~~or 9~~, wherein the recording of the first and/or second set of X-ray projection images is effected using continuous rotation-X-ray imaging at a plurality of projection angles.

11. (Currently Amended) X-ray imaging method as claimed in ~~any one of claims 8 to 10~~, wherein the recording of the second set ~~(6)~~ of X-ray projection images is effected at at least one fixed projection angle.

12. (Currently Amended) X-ray imaging method as claimed in ~~any one of the claims 8 to 11~~, wherein a computer-aided modeling of the vascular tree, with elimination of other anatomical structures contained in the first set of X-ray projection images, is effected to reconstruct the three-dimensional structure in method step b).